M/035/015

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DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY

Michael O. Leavitt
Governor

Dianne R. Nielson, Ph.D.
Executive Director

Don A. Ostler, P.E.
Director

288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870
(801) 538-6146 Voice
(801) 538-6016 Fax
(801) 536-4414 T.D.D.

January 3, 1997

Ms. Elaine J. Dorward-King, Ph.D.
Director, Environmental Affairs
Kennecott Utah Copper
8315 West 3645 South
Magna UT 84044-6001

Dear Ms. Dorward-King:

Subject: Review of Standard Operating Procedures for Kennecott Acidification Monitoring Program; Kennecott Tailings Impoundment; Ground Water Discharge Permit No. UGW350011

Review of the revised Standard Operating Procedures (SOP's) provided in your letter of November 11, 1996 is complete. These included SOP #5 (Kinetic Testing by the Humidity Cell Procedure) and SOP #6 (Sample Collection, Preservation, Chain of Custody, Archiving and Quality Assurance) that were requested in Don Ostler's letter of September 11, 1996. Additionally, a revised SOP for Acid Base Accounting was included to replace SOP's 1-4 that were previously in acceptable form.

There are a few relatively minor issues that need to be resolved in each SOP before final approval can be given. Additionally, to accommodate the new ABA protocol that is to replace SOP's 1-4, the SOP's probably should be re-numbered as follows:

SOP 1 - Acid Base Accounting
SOP 2 - Kinetic Testing by the Humidity Cell Procedure
SOP 3 - Sample Collection, Preservation, Chain of Custody, Archiving, and Quality Assurance

Revisions to the SOP's based on the attached list of items should be made as quickly as possible. Please provide revised SOP's no later than January 31, 1997.

Sincerely,

John Whitehead

John Whitehead, Ground Water Hydrologist
Ground Water Protection Section

JW:wlm

Enclosure

cc: Terry Sadler, Salt Lake County Health Dept. (W/out encl)
Wayne Hedberg, DOGM (W/encl)
Gene Farmer (W/encl)

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FILE:KENNECOTT TAILINGS IMPOUNDMENT

REVISIONS NEEDED TO SOP'S ATTACHED TO APPENDIX A;
KENNECOTT TAILINGS IMPOUNDMENT; ASSESSMENT OF
ACIDIFICATION POTENTIAL 1-3-97

SOP #1 ABA Protocol - Outstanding Issues

1. Augmentation of the narrative overview (Item II Summary) to explain the procedure is needed or short explanatory notes in the body of the text are needed so the reader understands why each step is being done.

2. Item III A, page 3 indicates that all samples will be oven dried at 105° C. Review of Item 9 on page 5 of the ASTM Kinetic Testing Protocol (ASTM D5744) discusses sample preparation and points out that alteration of some pyrite forms can take place in temperatures exceeding 100° C. Accordingly, samples should be either air dried or oven dried at a maximum temperature of 50° C for 24 hours or until a constant weight is reached. The SOP should be changed to reflect this.

3. The titration endpoint for NP calculation should be indicated. (The protocol KUC is using (Coastech 1989, Lawrence 1990) indicates 8.3.)

4. The header for item F is "Residual Sulfur". This should probably read "Calculation of Forms of Sulfur".

5. In section F 2 (b) The calculation for Pyritic Sulfur is confusing as written; perhaps a clearer way to express this would be:

   Pyritic Sulfur = Total Sulfur - Total Sulfur after HNO_3 Leach

   The units for calculations should be included.

6. The specifics for reporting results from ABA analysis should be delineated. At a minimum for each ABA analysis the following should be clearly reported:

   Total Sulfur (by LECO furnace), Hot Water Extractable Sulfur, HCL Extractable Sulfur, HNO_3 Extractable Sulfur, Residual Sulfur (as calculated in Item F 1(a) of the SOP), Acid Potential, Neutralization Potential, and ABA calculation result. All original lab sheets with results should be supplied along with a tabular presentation of the data.

7. The NP calculation in Sobek's method appears to differ from what KUC proposes? Please explain?

8. Explanation is needed as to when the "weight correction" procedure in sections D page 6 and E page 8 will be used.

9. Citation of EPA -600/2-78-054 on the front of SOP for ABA analysis references the 1978 Sobek method. The protocol described in the SOP is a modified version comparable to that described in Coastech Research Inc. 1989 and R.W. Lawrence 1990. This should be clarified.

SOP #5 Kinetic Testing Protocol - Outstanding Issues

1. The specific dimensions and methods of de-watering the humidity cell should be provided. Will this conform to the ASTM Standard published in May 1996? How will leach water be removed without removing solids?

2. When the sample is leached once a week, how long will the flooded cell be allowed to set with water before leachate is drained? (ASTM suggests 1 hour)

SOP #6 Sample Collection, Preservation, Chain of Custody, Archiving, and Quality Assurance

1. In section 2.1.1 on page 1 Part A the second sentence should be modified to eliminate the phrase "composite sample" such that the sentence reads:

   "Samples will be collected from 0 to 12 inches of depth below the surface."